

How to Collect and Examine Your Building Data



Before you can begin your initial building analyses, you will need to collect some information about the energy use of your targeted building stock. You may need to assemble an energy team to collect and analyze the data or to oversee the process. Some organizations may already have an energy analyst or other qualified individual on board to direct the data collection effort. If not, your organization may want to hire one. Alternatively, your energy team may opt to collect as much of the data as possible prior to hiring an expert. How you proceed will depend on the funds and expertise available to your organization.

Whichever approach you decide to take, this information is designed to guide you and your team through the process. If you have an analyst performing the work, the information provided will help you understand the objectives of the process so that you can assist in setting up the necessary contacts and make other contributions as appropriate. If you and your team are doing the work yourselves, the following outlined procedures will serve as a starting point for your data collection efforts. This document is designed to present a generic approach to each step of the data collection and analysis process. Each organization will find areas in which they need to augment or modify the generic approach to better address their particular situation.

Bear in mind that much useful guidance will also come from your local agencies and organizations, local experts, and other local sources. This document is designed to help you select an energy analyst and begin the collection and examination of data on your building stock. For those who are unfamiliar with utility practices and rate schedules, brief explanations and definitions are provided. Particular emphasis should be placed on ensuring the accuracy of the data elements, since they will provide the basis for significant financial investment decisions.

Selecting an Energy Analyst

People skilled at analyzing energy use in the particular types of buildings in your stock can assist your team in selecting the buildings that represent the best opportunities for savings. Finding a skilled analyst or analytical group is an integral part of finding the good opportunities. In choosing an analyst, you will want to look for the following qualifications:

- Building energy survey skills. The analyst should be experienced in using a light meter and other devices for performing initial on-site testing of a building's current energy use characteristics. Such surveys are intended to quickly identify buildings that are potentially large consumers of energy.
- Data Collection experience. The individual should have demonstrated experience in collecting buildings characteristics and energy data from utilities, using floor plans, developing occupant questionnaires, conducting building owner/operator phone interviews, and so forth.
- Building energy analysis expertise. The analyst should be experienced with methods for analyzing energy savings from retrofits and methods for assessing the relative energy efficiency of buildings. He or she should also be familiar with methods for handling utility-metered data, familiar with building energy metering methods, knowledgeable about how energy is used in different types of buildings, and skilled at identifying the buildings that are the best candidates for energy-efficiency measures.
- Communication and computer skills. These skills should include the ability to handle data archives and provide backup, the ability to handle large data files, familiarity with data processing software (if a large number of buildings are to be analyzed), and the ability to generate useful reports and presentations. A qualified energy analyst or analytical group can be identified through local business directories and associations or by consulting local utilities, government energy agencies, and architects. Engineering firms also provide such services or can direct you to local experts.

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Collecting Building Characteristics Data

Your first data collection task involves the gathering of building characteristics data for your building stock. Exhibit 1 shows the different types of data needed. All of these data should be relatively easy to obtain.

Exhibit 1: Building Data

Building Characteristics Data Elements

Needed

- Building type and use (i.e., principal building activity)
- Total square footage of building floor area
- Type of square footage (e.g., gross, net usable, etc.)
- Hours of occupancy – the actual amount of time that the building is used on a monthly basis.

Additional

- Ownership/occupancy (It may be useful to know who occupies a building when comparing it to other candidate buildings. Owner-occupants have the greatest incentive to implement energy saving measures.)
- Building age
- Plans and specifications (The team should try to obtain “as-built” plans and specifications from the building owner or manager. If not available, single-line diagrams will need to be drawn to indicate the equipment in place, connected loads, and other major features.)
- Types of renovations previously performed
- Energy system operation and maintenance (O&M) practices (If available, O&M logs and equipment manuals help indicate how equipment is being operated and maintained and how changes in O&M routines may have affected equipment performance. Valid warranties and guarantees on equipment that may be modified could also be useful.)
- Heating and cooling fuels
- Type of control system
- Types of lighting (by percentage of floorspace)
- Type of heating/cooling system
- Extent of computer use by occupants (general types and estimated quantities)

Floor-area values are often available from the property or lease records. Such values are likely to be based on usable conditioned floor area. Insurance and construction costs are generally estimated on the basis of gross floor area, which is the total floor area on all levels of a building measured from the outside surface of the walls (or from the centerline of walls of attached buildings). Other methods of measurement may also be used; the important thing is to use a consistent set of floor-area data for your building stock.

The additional building data elements in Exhibit 1 will typically be needed for later use in the evaluation of individual buildings. If these data elements are readily available, it may be best to collect them now, along with the required data. If they are difficult to obtain, you may wish to wait until after the initial analysis, when the focus is likely to be on a smaller number of buildings.

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Collecting Energy Data

For each building in the stock targeted by your organization, you will also need to collect energy data. A minimum of one year of monthly data is required for the basic analysis of your targeted building stock, but two years of data are more desirable since that is the amount needed to perform certain graphical analyses. The specific data elements that need to be collected for each building are listed in Exhibit 2.

Exhibit 2: Energy Data Elements

Electric

- Building Identification as determined by utility account number, meter location, and/or customer name
- Meter Number
- Billing Start and End Dates
- Monthly Total Electrical Consumption (in kWh)
- Monthly Peak Electrical Demand (in kW, if available from the utility)
- Monthly Total Electrical Cost (in \$)
- Rate Schedule Identification

Optional data elements that may also prove useful include the following:

- Monthly Electrical Off-Peak Consumption (kWh/month) may not be used by the utility directly, but may be available through 15-minute demand data for off-peak hours
- Monthly Electrical On-Peak Consumption (kWh/month) may not be used by the utility
- Contract Demand (in kW)
- Average Electric Consumption Unit Cost (in \$/kWh)
- Average Electric Demand Unit Cost (in \$/kW)

Gas

- Building Identification
- Meter Number
- Billing Start and End Dates
- Monthly Natural Gas Consumption (in kBtu) -- if gas consumption is reported in other units, it should be converted to kBtu
- Monthly Natural Gas Cost (in \$)
- Rate Schedule Identification

Optional data elements that may also prove useful include the following:

- Average Gas Consumption Unit Cost (in kBtu)
- Monthly Peak Gas Demand (in kBtu/day)

Other Fuels

- Similar data can also be collected for fuel oil, propane, coal, purchased steam, and chilled water, if applicable to your building stock.

The best source for energy data is usually the utility or utilities providing energy services to the buildings under consideration. If the data you want are not already available from past utility bills, they may be obtained through your utility account representative. Some utilities also offer a range of programs and services, from energy audits to rebates or financing programs for the installation of energy-efficient equipment. You will find it useful to establish a continuing working relationship with your utility account representative and to understand the conditions and costs of the services provided.

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Requesting Data from Utilities

Upon request, utilities can provide their customers with data on energy consumption in their buildings. These data are usually available in a format similar to that of monthly energy bills and cover a period of 12 to 24 months (or billing cycles) prior to the date of inquiry. If different fuels are provided by more than one utility, consumption data should be gathered from each company.

Some utilities will require a written request (including authorization from the building owners) before they will release the appropriate data (see sample letter in Exhibit 3). In order to ensure a prompt and thorough response, both the requester and the supplier of building energy information should have top-level authority in their respective organizations. For example, the mayor or his or her immediate assistant might make the first contact with the utility's general manager to explain the need to quantify energy consumption by the targeted building stock and request cooperation on the project. Upon agreement, contacts should be set up within both organizations to handle the transfer of energy data.

Exhibit 3: Sample Utility Letter

Date _____

Ms./Mr. _____
Utility Engineer
City of _____
Address _____
City, State Zip _____

Dear _____:

RE: REQUEST FOR BILLING INFORMATION

I enjoyed the opportunity to speak with you on August 5 and appreciate your willingness to provide the electrical billing history and related information for our analysis. Signed authorizations from the building owners are enclosed. We are requesting the following data for all facilities shown on the attached list for the period of January 1, 2001, through the most recent billing:

- service address;
- account address, if different than service address;
- account name;
- account number;
- meter number;
- beginning and ending dates for each billing period;
- meter reading or total kWh for each billing period;
- peak demand (in kW);
- total charges, minus special service fees, for each billing period;
- applicable rate schedule;
- off-peak consumption (kWh) for each billing period (if applicable); and
- on-peak consumption (kW) for each billing period (if applicable).

Thank you for your cooperation in supplying us with the billing records for these facilities. It would be helpful if we were to receive the information by the end of August. If you have questions regarding my requests, please do not hesitate to call me.

Sincerely yours,

Enclosure

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Data may be requested in several formats, although an electronic format is the most efficient. Plain-text versions of the data (sometimes called ASCII) are often the easiest to transfer from one computer to another, but you will want to make certain that the format you request can be read easily on your own computer.

At a minimum, you will want to request data for the most recent 12 months or billing periods and, if possible, you should obtain 18 to 24 months of data to support further analyses. Typically, you will need to confirm the account numbers and service addresses of the targeted buildings. It may be difficult to match utility meters with their correct buildings and accounts and to verify which buildings are metered, but these steps are necessary to confirm the results of any efficiency improvement efforts. Since some buildings may be served by more than one meter, steps should be taken to ensure that no meter is counted twice or omitted altogether. Your utility account representative should be able to assist you in locating and identifying service locations and account numbers.

Examining the Energy Data

Although utilities are generally reliable in reporting data, steps should be taken to understand and verify all values. Occasionally, meters may be misread or misreported, or may even be broken. Identifying these instances as they occur could lead to substantial monetary savings. For this and other reasons, it is a good idea to continue your data collection and verification efforts throughout the retrofit program and on a continuing basis thereafter.

The data you collect will help to validate the savings achieved and facilitate rapid identification of any potential energy problems. In examining energy consumption data, remember to do the following:

- Confirm that the number of utility accounts collected corresponds to the number of meters available at each site. Determine how utility account data should be combined or separated to represent buildings, clusters of buildings, or portions of buildings, and match the resulting energy use data to the appropriate floor area data.

- Examine the data to look for any months with unusually high or low levels of consumption or demand. If unusual months are found, consult with building occupants, equipment operators, repair people, and your utility representative to account for the unusual consumption or demand.
- Take steps to correct any data believed to be erroneous. Where correction is not possible, keep track of the particular data element so that it does not inappropriately impact your assessment of building performance (e.g., when comparing building data to national statistics or graphing the data).
- In analyzing energy use patterns, remember that the amount of energy a building consumes can be substantially affected by weather conditions. Your energy team may want to obtain weather data for each year of energy data collected. Such data is usually available from the local utility, but may also be obtained from the National Climatic Data Center at <http://lwf.ncdc.noaa.gov>.

Weather adjustments can improve the results of energy analyses from buildings, but this type of analysis can also be expensive and time consuming. Verification of energy use data is not a trivial task, but is crucial to the overall effort to improve energy efficiency. Knowledge of local utility rate schedules and energy use patterns will be particularly helpful.

For more information contact the Rebuild America Clearinghouse at 252-459-4664 or visit www.rebuild.gov

